

frequency distributions. O-D travel time was used as travel impedance and entered the friction factor function as  $d_{ij}$ .

## Network Assignment

### *Stochastic Traffic Assignment*

Traffic assignment models are used to estimate the flow of traffic on a network. These models take as input a matrix of flows that indicate the volume of traffic between origin and destination (O-D) pairs. The flows for each O-D pair are loaded onto the network based on the travel time or impedance of the alternative paths that could carry this traffic. TransCAD provides a few traffic assignment procedures, which include All-or-Nothing, Capacity Restraint, User Equilibrium, and Stochastic with and without User Equilibrium assignment methods.

Since modeling of auto trips, which usually account for over 80% of the traffic on highways, are out of the scope of this study, any capacity constrained assignment approach such as the User Equilibrium assignment method was not able to be used for traffic assignment. Of the non-capacity-constrained assignment approaches, the multi-path stochastic assignment method was finally picked in this model for truck traffic assignment. This method uses Robert Dial's algorithm, which distributes trips between O-D pairs among multiple alternative paths that connects the O-D pairs. The proportion of the total trips that is assigned to a particular path equals the choice probability for that path, which is calculated by a logit route choice model. Generally speaking, the smaller the travel time of a path, compared with the travel times of the other paths, the higher its choice probability would be. This method makes more sense than All-or-Nothing assignment where the single shortest path between an O-D pair takes all the trip interchanges for that O-D pair.

### *FAF2 Truck Trip Assignment*

Network assignment of FAF2 trucks involves the estimation of FAF2 truck traffic on each individual link of the highway network. Most statewide models use the all-or-nothing assignment technique to preload trucks and a static equilibrium technique to assign trucks and passenger vehicles together. The North Carolina truck network model does not include the passenger vehicle component. Hence, the multi-path stochastic assignment technique is chosen for assigning the truck trips where all truck trips between an O-D pair get assigned to the few shortest paths.

### Short Haul Truck Trip Assignment

Similar to the network assignment of FAF2 2006 ODs, a multi-path stochastic assignment is applied to assign 2006 short haul ADTT OD matrix to the highway network. The total trucks on North Carolina truck network model are then estimated as the sum of FAF2 trucks and short haul truck trips.

## Chapter Summary

This chapter discussed the methodology adopted to implement the North Carolina truck network model and to validate the model and its base year traffic estimates. The methodology is based on accepted practices for developing a statewide network model. However, several issues remain to be addressed as the model is developed. The issues include trip generation rates for generating internal short haul truck trips, accurate use of national synthetic data while using it at the state level, trip length distribution calibration, and choice of assignment technique. Some of these issues will be addressed in the subsequent chapter on model calibration and validation.

Several improvements can be made to the model in the future. Future refinements to the TAZs in metro areas may include linkage to Piedmont Crescent MPO models which are based on census tracts. Future